

# The LXGW Font Family\* | 落霞与孤鹜齐飞 秋水共长天一色

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This package packs a selection of open-source fonts from the 霞鹜文楷, 霞鹜文楷<sup>国标</sup>, 霞鹜臻楷, 霞鹜漫黑, 小赖字体, and 悠哉字体, which are released into public domain by LXGW since 2021. They are licensed under the [SIL Open Font License \(OFL\)](#).

## Abstract

The LXGW Font Family provides an open-source CJK font family with a comprehensive character set for Chinese (Simplified/Traditional), Cantonese, and Japanese. A `fontset` configuration of this font family for the `ctex-kit` is also provided in this package.

## 1 Usage

Users are allowed to use the friendly interface: the `fontset` key in the `ctex` package

```
\usepackage[fontset = lxgw]{ctex}
```

or the `ctex` classes

```
\documentclass[fontset = lxgw]{ctex<art|book|rep|beamer>}
```

with  $X_{\text{La}}^{\text{TeX}}$ ,  $\text{Lua}^{\text{TeX}}$ ,  $\text{E}^{\text{TeX}}$  + DVIPDFMx,  $\text{up}^{\text{TeX}}$  + DVIPDFMx, and  $\text{Ap}^{\text{TeX}}$  (aka  $\text{p}^{\text{TeX}}$ -ng) supported.  $\text{pdf}^{\text{TeX}}$  is not supported temporarily since the long mapping time of `zhmap`. Additionally, the following four commands are provided for convenience.

<code>\songti</code>	宋体 (CJKmainfont): LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf.
<code>\heiti</code>	黑体 (CJKsansfont): LXGWMarkerGothic-Regular.ttf (with the <code>AutoFakeBold</code> option).
<code>\fangsong</code>	仿宋 (CJKmonofont): LXGWXiaolai-Regular.ttf (with the <code>AutoFakeBold</code> option).
<code>\kaishu</code>	楷书 (itshape of CJKmainfont): LXGWYozai-Regular.ttf, LXGWYozai-Medium.ttf.

Note that the names of the four control sequences make no sense here, just to *keep the same naming habit of ctex-kit*.

The implementation of this user-friendly interface is included in [A.1](#), [A.2](#), and [A.3](#).

\*<https://github.com/lxgw>, <https://github.com/myhsia/LXGW-CTAN>

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## 2 Font Demos

The following lists the Chinese/English name, filename, and demos of the fonts: Cantonese, Japanese, Chinese (Simplified/Traditional) versions of “**I Can Eat Glass**”, missing character markers are provided with punctuation compression disabled and fulfilling line.

霞鹜文楷 (LXGW WenKai) LXGWWenKaiLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。③③③

霞鹜文楷 国标 (LXGW WenKai<sub>GB</sub>) LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。③③③

霞鹜漫黑 (LXGW Marker Gothic) LXGWMarkerGothic-Regular.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。③③③

小赖字体 (Xiaolai Font) LXGWXiaolai-Regular.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。③③③

悠哉字体 (Yozai Font) LXGWYozai-Regular.ttf, LXGWYozai-Medium.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。③③③

## A The Source Code

### A.1 The `ctex-fontset-lxgw.def` file

Start the optionlist fontset for l3docstrip.

```
1 <*fontset>
```

Declare the ctex-kit font configuration file with date, version, and description.

```
2 \ProvidesExplFile {ctex-fontset-lxgw.def} {2026-01-01} {v1.521J}
3 {lxgw fontset configuration for ctex-kit}
```

Load CJK font family, interface, accepts the following 4 branches, provided by ctex-kit.

```
4 \ctex_fontset_case:nnnn
```

pdf<sub>T</sub><sub>E</sub>X (generate PDF) This branch is no longer supported here, and a `fontset-unavailable` error will raise.

```
5 { \ctex_fontset_error:n { lxgw } }
```

**T<sub>E</sub>Xhackers note:** For some fontset that supports this branch, line 4 – 5 should be replaced as a line

```
\ctex_fontset_case:nnn
```

pdf<sub>T</sub><sub>E</sub>X (generate DVI) For those use L<sub>A</sub>T<sub>E</sub>X + DVIPDFMx.

```
6 {
```

Load the .spa file for the CJKpunct package.

```
7 \ctex_file_input:n { ctexpunct-lxgw.spa }
```

Case choice controlled by the zhmap key of ctex-kit.

```
8 \ctex_zhmap_case:nnn
```

#1: Content of this argument will be outputted to the input stream when `zhmap = zhmcJK`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_i:nnn
```

The LXGW font family uses the UniGB-UTF16-H cmap (Character To Glyph Index Mapping Table).

```
9 {
10   \setCJKmainfont { LXGWWenKaiLite-Regular.ttf }
11   [
12     cmap          = UniGB-UTF16-H,
13     BoldFont      = LXGWZhenKaiGB-Regular.ttf,
14     ItalicFont    = LXGWYozai-Regular.ttf,
15     BoldItalicFont = LXGWYozai-Medium.ttf
16   ]
17   \setCJKsansfont { LXGWMarkerGothic-Regular.ttf }
18   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
19   \setCJKmonofont { LXGWXiaolai-Regular.ttf }
20   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
21   \setCJKfamilyfont { zhsong } { LXGWWenKaiLite-Regular.ttf }
22   [ cmap = UniGB-UTF16-H, BoldFont = LXGWZhenKaiGB-Regular.ttf ]
23   \setCJKfamilyfont { zhhei } { LXGWMarkerGothic-Regular.ttf }
24   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
25   \setCJKfamilyfont { zhfs } { LXGWXiaolai-Regular.ttf }
26   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
27   \setCJKfamilyfont { zhkai } { LXGWYozai-Regular.ttf }
28   [ cmap = UniGB-UTF16-H, BoldFont = LXGWYozai-Medium.ttf ]
```

Configure the usages of the edge information of the defined CJK families.

```

29         \ctex_punct_set:n { lxxw }
30         \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
31         \ctex_punct_map_family:nn { \CJKsfdefault } { zhhei }
32         \ctex_punct_map_family:nn { \CJKttdefault } { zhfs }
33         \ctex_punct_map_bfseries:nn { \CJKrmdefault, zhsong } { zhsongb }
34         \ctex_punct_map_bfseries:nn { \CJKsfdefault, zhhei } { zhheib }
35         \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
36     }

```

#2: Content of this argument will be outputted to the input stream when `zhmap = true`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_ii:nnn
```

Load the mapping file `ctex-zhmap-lxxw.tex` for `zhmatrices` and set `\CJKrmdefault`, `\CJKsfdefault`, `\CJKttdefault` respectively.

```

37     {
38         \ctex_load_zhmap:nnnn { rm } { zhhei } { zhfs } { lxxw }

```

Configure the usages of the edge information of `\CJKrmdefault`.

```

39         \ctex_punct_set:n { lxxw }
40         \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
41         \ctex_punct_map_bfseries:nn { \CJKrmdefault } { zhhei }
42         \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
43     }

```

#3: Content of this argument will be outputted to the input stream when `zhmap = false`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_iii:nnn
```

Here will raise a `fontset-unavailable` error.

```

44     { \ctex_fontset_error:n { lxxw } }
45 }

```

up<sub>TeX</sub>, Ap<sub>TeX</sub> (aka p<sub>TeX</sub>-ng) For those use up<sub>TeX</sub> + DVIPDFMx. Configure the basic font mapping for up<sub>TeX</sub>. Due to the definition in `zhmetrics-uptex`, configure

1. upshape of serif font.
2. bfseries of serif font.
3. itshape of serif font.
4. upshape of sans font.
5. bfseries of sans font.
6. upshape of mono font.

```

46 {
47     \ctex_set_upfonts:nnnnnn
48     { LXGWenKaiLite-Regular.ttf }
49     { LXGWZhenKaiGB-Regular.ttf }
50     { LXGWYozai-Regular.ttf }
51     { LXGWMarkerGothic-Regular.ttf }
52     { LXGWMarkerGothic-Regular.ttf }
53     { LXGWXiaolai-Regular.ttf }

```

Config the NFSS font families `zhsong`, `zhhei`, `zhfs`, and `zhkai` to the JFM name in normal type and bold type. Leave empty for those font families with no bold version.

```

54     \ctex_set_upfamily:nnn { zhsong } { upzhserif } { upzhserifb }
55     \ctex_set_upfamily:nnn { zhhei } { upzhsans } { upzhsans }
56     \ctex_set_upfamily:nnn { zhfs } { upzhmono } { }
57     \ctex_set_upfamily:nnn { zhkai } { upzhserifit } { }
58 }

```

X<sub>3</sub>TeX, LuaTeX For those use X<sub>3</sub>TeX or LuaTeX.

```

59 {
60   \setCJKmainfont { LXGWWenKaiLite-Regular }
61   [
62     Extension      = .ttf,
63     BoldFont       = LXGWZhenKaiGB-Regular,
64     ItalicFont     = LXGWYozai-Regular,
65     BoldItalicFont = LXGWYozai-Medium.ttf
66   ]
67   \setCJKsansfont { LXGWMarkerGothic-Regular }
68   [ Extension = .ttf, AutoFakeBold ]
69   \setCJKmonofont { LXGWXiaolai-Regular }
70   [ Extension = .ttf, AutoFakeBold ]
71   \setCJKfamilyfont { zhsong } { LXGWWenKaiLite-Regular }
72   [ Extension = .ttf, BoldFont = LXGWZhenKaiGB-Regular ]
73   \setCJKfamilyfont { zhhei } { LXGWMarkerGothic-Regular }
74   [ Extension = .ttf, AutoFakeBold ]
75   \setCJKfamilyfont { zhfs } { LXGWXiaolai-Regular }
76   [ Extension = .ttf, AutoFakeBold ]
77   \setCJKfamilyfont { zhkai } { LXGWYozai-Regular }
78   [ Extension = .ttf, BoldFont = LXGWYozai-Medium ]
79 }

```

**\songti** Shortcuts that same as those in the ctex-kit.

```

\heiti      80 \NewDocumentCommand \songti { } { \CJKfamily { zhsong } }
\fangsong  81 \NewDocumentCommand \heiti { } { \CJKfamily { zhhei } }
\kaishu    82 \NewDocumentCommand \fangsong { } { \CJKfamily { zhfs } }
           83 \NewDocumentCommand \kaishu { } { \CJKfamily { zhkai } }

```

(End of definition for `\songti` and others. These functions are documented on page 1.)

End the optionlist fontset for l3docstrip.

```
84 </fontset>
```

## A.2 The ctex-spa-make.tex and the ctexpunct-lxgw.spa file

The .spa file of the corresponding font will be used for the CJKpunct package to achieve the punctuation compression, which can ensure the best typeset effect (under the pdfTeX engine). Run the following script, ctex-spa-make.tex, by executing

```
xetex ctex-spa-make
```

in the terminal. Then, one can obtain the ctexpunct-lxgw.spa file.

**Implementation of the script** Start the optionlist makespa for l3docstrip.

```
85 <*makespa>
```

Assign the module name of the variables and control sequences, which will be automatically replaced by l3docstrip.

```
86 <@@=ctex>
```

Loading the macro file ctex-spa-macro.tex provided by ctex-kit.

```
87 \input ctex-spa-macro %
```

However, the macro file needs to be hacked due to the interface change of Xe<sub>La</sub>TeX.

```

88 \ExplSyntaxOn
89 \cs_set_protected:Npn \__ctex_write_family:nn #1#2
90 {
91   \group_begin:
92   \tex_font:D \l__ctex_punct_font = "[#2]" ~ at ~ 100 pt \scan_stop:
93   \l__ctex_punct_font
94   \clist_clear:N \l__ctex_punct_bounds_clist
95   \seq_map_inline:Nn \c__ctex_punct_seq
96   {
97     \exp_args:No \__ctex_save_bounds:n
98     { \int_use:N \tex_XeTeXcharglyph:D ##1 }
99   }
100   \iow_now:Nx \g__ctex_spa_iow
101   {
102     \token_to_str:N \ctexspadef {#1}
103     { \l__ctex_punct_bounds_clist , , , }
104   }
105   \group_end:
106 }
107 \ExplSyntaxOff

```

List all the CJK families with the corresponding font files in terms of “case-pairs”.

```

108 \MAKESPA {ctexpunct-lxgw.spa}
109 {
110   {lxgwzhsong}      {LXGWenKaiLite-Regular} ,
111   {lxgwzhsongb}     {LXGWZhenKaiGB-Regular} ,
112   {lxgwgbzhsong}    {LXGWenKaiGBLite-Regular} ,
113   {lxgwgbzhsongb}   {LXGWZhenKaiGB-Regular} ,
114   {lxgwzhhei}       {LXGWMarkerGothic-Regular} ,
115   {lxgwzhfs}        {LXGWXiaolai-Regular} ,
116   {lxgwzhkai}       {LXGWYozai-Regular} ,
117   {lxgwzhkaib}      {LXGWYozai-Medium} ,
118 }

```

End of the script.

```
119 \primitive\end
```

Restore the module name.

```
120 <@@=>
```

End the optionlist zhmap for l3docstrip.

```
121 </makespa>
```

### A.3 The ctex-zhmap-lxgw.tex file

Start the optionlist zhmap for l3docstrip.

```
122 <*zhmap>
```

Forked from the zhmap optionlist of ctex.dtx<sup>1</sup>.

```

123 \begingroup\catcode61\catcode48\catcode32=10\relax%
124   \catcode 35=6   % #
125   \catcode 45=12 % -

```

<sup>1</sup><https://github.com/CTeX-org/ctex-kit/blob/master/ctex/ctex.dtx>

```

126 \catcode123=1 % {
127 \catcode125=2 % }
128 \toks0{\endlinechar=\the\endlinechar\relax}%
129 \toks2{\endlinechar=-1 }%
130 \def\x#1 #2 {%
131   \toks0\expandafter{\the\toks0 \catcode#1=\the\catcode#1\relax}%
132   \toks2\expandafter{\the\toks2 \catcode#1=#2 }}%
133 \x 13 5 % carriage return
134 \x 32 10 % space
135 \x 35 6 % #
136 \x 40 12 % (
137 \x 41 12 % )
138 \x 45 12 % -
139 \x 46 12 % .
140 \x 47 12 % /
141 \x 58 12 % :
142 \x 60 12 % <
143 \x 61 12 % =
144 \x 64 11 % @
145 \x 91 12 % [
146 \x 93 12 % ]
147 \x 123 1 % {
148 \x 125 2 % }
149 \edef\x#1{\endgroup%
150   \edef\noexpand#1{%
151     \the\toks0 %
152     \let\noexpand\noexpand\noexpand#1%
153     \noexpand\noexpand\noexpand\undefined%
154     \noexpand\noexpand\noexpand\endinput}%
155     \the\toks2}%
156 \expandafter\x\csname ctex@zhmap@endinput\endcsname
157 \begingroup\expandafter\endgroup
158 \expandafter\let\csname ifzhmappdf\expandafter\endcsname\csname
159   \expandafter\ifx\csname ifctexpdf\endcsname\relax
160     \expandafter\ifx\csname pdfoutput\endcsname\relax
161       iffalse\else\ifnum\pdfoutput < 1 iffalse\else iftrue\fi\fi
162     \else ifctexpdf\fi
163 \endcsname
164 \begingroup
165 \expandafter\ifx\csname ProvidesFile\endcsname\relax
166   \long\def\x#1\ProvidesFile#2[#3]{%
167     #1%
168     \immediate\write-1{File: #2 #3}%
169     \expandafter\xdef\csname ver@#2\endcsname{#3}}
170   \expandafter\x%
171 \fi
172 \endgroup

Provides the identification information of the font map loader.

173 \ProvidesFile{ctex-zhmap-lxgw.tex}%
174 [2026-01-01 v1.521J lxgw font map loader for DVIPDFMx (CTEX)]

Font map loader for pdfTeX and DVIPDFMx.

175 \ifzhmappdf

```

Since pdf $\TeX$  maps too slowly, this mode is obsolete.

```

176 \iffalse
177 \pdfmapline{=gbk@UGBK@ <LXGWenKaiLite-Regular.ttf}
178 \pdfmapline{=gbksong@UGBK@ <LXGWenKaiLite-Regular.ttf}
179 \pdfmapline{=gbkkai@UGBK@ <LXGWYozai-Regular.ttf}
180 \pdfmapline{=gbkhei@UGBK@ <LXGWMarkerGothic-Regular.ttf}
181 \pdfmapline{=gbkfs@UGBK@ <LXGWXiaolai-Regular.ttf}
182 \pdfmapline{=cyberb@Unicode@ <LXGWenKaiLite-Regular.ttf}
183 \pdfmapline{=unisong@Unicode@ <LXGWenKaiLite-Regular.ttf}
184 \pdfmapline{=unikai@Unicode@ <LXGWYozai-Regular.ttf}
185 \pdfmapline{=unihei@Unicode@ <LXGWMarkerGothic-Regular.ttf}
186 \pdfmapline{=unifs@Unicode@ <LXGWXiaolai-Regular.ttf}
187 \pdfmapline{=gbksongsl@UGBK@ <LXGWenKaiLite-Regular.ttf}
188 \pdfmapline{=gbkkaisl@UGBK@ <LXGWYozai-Regular.ttf}
189 \pdfmapline{=gbkheisl@UGBK@ <LXGWMarkerGothic-Regular.ttf}
190 \pdfmapline{=gbkfssl@UGBK@ <LXGWXiaolai-Regular.ttf}
191 \pdfmapline{=unisongsl@Unicode@ <LXGWenKaiLite-Regular.ttf}
192 \pdfmapline{=unikaisl@Unicode@ <LXGWYozai-Regular.ttf}
193 \pdfmapline{=uniheisl@Unicode@ <LXGWMarkerGothic-Regular.ttf}
194 \pdfmapline{=unifssl@Unicode@ <LXGWXiaolai-Regular.ttf}
195 \fi

```

Configuration for pdf $\TeX$  (generate DVI).

```

196 \else

```

Configure the upright shape of `\songti`, `\kaishu`, `\heiti`, and `\fangsong` mapping for GBK encoding and UTF8 encoding.

```

197 \special{pdf:mapline gbk@UGBK@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf}
198 \special{pdf:mapline gbksong@UGBK@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf}
199 \special{pdf:mapline gbkkai@UGBK@ UniGB-UTF16-H LXGWYozai-Regular.ttf}
200 \special{pdf:mapline gbkhei@UGBK@ UniGB-UTF16-H LXGWMarkerGothic-Regular.ttf}
201 \special{pdf:mapline gbkfs@UGBK@ UniGB-UTF16-H LXGWXiaolai-Regular.ttf}
202 \special{pdf:mapline cyberb@Unicode@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf}
203 \special{pdf:mapline unisong@Unicode@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf}
204 \special{pdf:mapline unikai@Unicode@ UniGB-UTF16-H LXGWYozai-Regular.ttf}
205 \special{pdf:mapline unihei@Unicode@ UniGB-UTF16-H LXGWMarkerGothic-Regular.ttf}
206 \special{pdf:mapline unifs@Unicode@ UniGB-UTF16-H LXGWXiaolai-Regular.ttf}

```

Similar for the (fake) slant shape, set the *Afine Transformation coefficient* to 0.167, which is the same as the default value of `AutoFakeSlant` in the `xeCJK` package.

```

207 \special{pdf:mapline gbksongsl@UGBK@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf -s .167}
208 \special{pdf:mapline gbkkaisl@UGBK@ UniGB-UTF16-H LXGWYozai-Regular.ttf -s .167}
209 \special{pdf:mapline gbkheisl@UGBK@ UniGB-UTF16-H LXGWMarkerGothic-Regular.ttf -s .167}
210 \special{pdf:mapline gbkfssl@UGBK@ UniGB-UTF16-H LXGWXiaolai-Regular.ttf -s .167}
211 \special{pdf:mapline unisongsl@Unicode@ UniGB-UTF16-H LXGWenKaiLite-Regular.ttf -s .167}
212 \special{pdf:mapline unikaisl@Unicode@ UniGB-UTF16-H LXGWYozai-Regular.ttf -s .167}
213 \special{pdf:mapline uniheisl@Unicode@ UniGB-UTF16-H LXGWMarkerGothic-Regular.ttf -s .167}
214 \special{pdf:mapline unifssl@Unicode@ UniGB-UTF16-H LXGWXiaolai-Regular.ttf -s .167}
215 \fi

```

End the optionlist `zhmap` for `l3docstrip`.

```

216 \</zhmap>

```



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